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ABSTRACT

A study compared the GCSE benchmarks of all local education authorities (LEAs) in England and Wales. The impetus was that a comparison on almost any performance indicator of initial education flattered England, and comparisons led to the conclusion that the education system in Wales was failing. The performance measure was the GCSE benchmark of the percentage of the relevant age cohort gaining five or more grades A-C; the 1994 figure was lower for Wales. Independent variables used to characterize LEAs were social class, free school meals, population, area, and population density. Correlations between data were calculated using Pearson's r; a multiple linear regression analysis was conducted. All independent variables correlated significantly with the GCSE benchmark, with the percentage taking free school meals accounting for two-thirds of the variance in results between LEAs. No evidence was found of poor school performance in Wales. The initial schooling and background characteristics of each participant were used to create a series of logistic regression models to analyze post-compulsory learning trajectories. Nine predictor variables at age 15 or less were significant in predicting examination results at 16; interactions between variables were more significant in many cases. The type of secondary school attended was the major determinant of qualifications at age 16 until fairly recently. (Contains a 53-item bibliography.) (YLB)

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A Cardiff and Bristol University ESRC- funded Learning Society Project

WORKING PAPER 8

PLUGGING THE GAP
The Welsh school-effect and Initial education trajectories

Stephen Gorard
with Gareth Rees, Ralph Fevre and John Furlong

1997

SCHOOL OF EDUCATION

Cardiff University of Wales

2

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THE WELSH SCHOOL EFFECT

Introduction

There is increasing recognition that the education systems of England and Wales are separating, while these policy differences are leading to inevitable comparisons in terms of performance indicators. A straightforward comparison of the two regions on almost any indicator of initial education flatters England, and such comparisons have led some commentators to see this as a failing of the education system in Wales. This paper compares the GCSE benchmarks of all LEAs in England and Wales in the light of various social and geographical factors that have been shown to affect school performance. When these factors are used as the independent variables in a multiple regression analysis, no evidence is found of poor school performance in Wales. In fact, children attending schools in Wales have, if anything, a slight advantage over their peers in England.

An education policy for Wales

Despite earlier attitudes stemming from a "for Wales see England" mentality, the education system in Wales is now markedly different to that in England, more so than simple regional variations within England, and the differences are increasing. Initial education in Wales is administered by the Welsh Office, not the Department for Education and Employment. The majority of public examinations are taken using papers from the Welsh Joint Education Committee. There are several differences between the National Curriculum for Wales, and that for England, with subjects such as History, Geography, Art and Music having separate orders. The differences are in perspective as well as content, since, according to legislation, all pupils in Wales have the right to learn about Welsh language, culture and history. There is, or should be, a "*general Welshness pervading pupil's learning experiences*" (Jones and Lewis 1995 p. 24). The National Curriculum for Wales also specifies that Welsh language teaching is compulsory in all state-funded schools (Welsh Office 1995_a). The uniformity of schools in Wales is remarkable. Among the 2,048 schools of all types in Wales in 1994, there were no City Technology Colleges, or similarly specialist schools for drama, sport, or languages (Welsh Office 1995_b). There were only 15 Grant Maintained (GM) schools altogether. In fact, fewer than 1% of schools in Wales have opted out, compared to more than 4% in England (Halpin *et al.* 1997). Of the 484,322 full-time pupil equivalents in Wales in 1994, only 5% of the school population were in GM, independent, and special schools combined (Welsh Office 1995_b). Parents in Wales do not have a realistic option of using local fee-paying schools, since there are so few such schools, including none in Mid-Wales, and only eight which until now have been able to offer Assisted Places (Gorard 1996). On the other hand, Wales has one type of school unknown in England, the Ysgolion Cymraeg or Welsh-medium schools.

These and other differences have led to an increasing separation of Welsh educational policy from that of England, and to the development of school "improvement" measures and attainment targets specific to Wales (e.g. Welsh Office 1995c, Welsh Office 1997). To a large extent these measures may have been prompted by the view of some educational researchers and at least one previous Secretary of State that schools in Wales are generally not performing as well as schools in England.

The "schooled to fail" myth

The notion that schools in Wales are being outperformed by those in England is a seductive one, providing a spur for regional schools to improve. It is based primarily upon the Loosmore report, inspection reports, the writing of researchers such as Reynolds, and raw score performance indicators. On almost any measure of school performance or school effectiveness, previous authors have suggested that Wales is being outperformed by England (e.g. Jones 1996). A national survey of non-attendance at school in the 1980s found the situation in Wales much worse than in England, even in areas with similar socio-economic disadvantages, but particularly in urban areas like Merthyr Tydfil and Cardiff (in Reynolds 1990).

In the past, schools in Wales have been seen as concentrating too much on the more able pupils to the neglect of others. The grammar school tradition, after 1944, polarised high attainment and high failure rates, wasting talent and encouraging social division (in Istance and Rees 1995). The 1981 Loosmore report found that Welsh schools seemed overly concerned with the most able children, and that consequently too many of the others were leaving school with no qualifications at all. In 1977/78, 28% of pupils left school in Wales without any qualification (Jones 1990). This "failure" rate has always been higher than in England. Even by 1989, when only 9.5% of children in England left school with no qualifications, and this figure was decreasing every year, the figure for Wales was 17%, twice the size (Reynolds 1995). Until the advent of comprehensivisation in the 1970s, schools in Wales therefore produced a high proportion of relatively well-qualified school leavers as well as a high proportion that were completely unqualified (Delamont and Rees 1996). This model has now apparently altered with only the high failure rate retained.

More people now leave education empty-handed in Wales than in the rest of the UK, and fewer gain the qualifications, 2+ A levels, that will allow them direct continuation to academic Higher Education (in Istance and Rees 1994). In some regions of Wales, such as the coastal regions, the benchmark figures of pupils have improved from 1992 to 1995, but in others, particularly the rural areas, there is increasing polarisation between the top and bottom achievers (Hackett 1995). In fact, 36% of 16 year olds gain no GCSEs grades

A to C, while only 46% gain a C or better in English, 40% in Mathematics and 39% in Science (Welsh Office 1995b). In terms of qualifications for the most qualified school leavers, the situation is improving in Wales, with 37% of the workforce now having 2 A levels or equivalent (Welsh Office 1995d). However, this improvement is no better than in the rest of the UK, starts from a lower base figure and is tainted by the very high "failure" rate. The overall level of education in the population aged 25 to 59 in Wales is below average for the UK (Eurostat 1995).

The introduction of league tables of GCSE examination results since 1993 have shown a similar picture. Even though the levels of social deprivation in some English regions are similar to those of Wales, Welsh schools are still producing significantly worse results (TES 1993, 1994, 1995). The proportion of children leaving schools with no qualifications is higher in Wales than in England and rising, while the proportion of children with 5+ GCSEs at grades A-C is lower (TES 1995). As some indication that local prosperity plays little part in outcomes, South Glamorgan, including Cardiff has the second highest rate of pupils leaving with no qualifications in Wales (18.6%), while it is an area of relative affluence, according to Reynolds (1990). One possible reason for this high "failure" rate in Wales which has been suggested is that the examinations taken are of a higher standard, so that the WJEC papers are not comparable to those of the English examination groups. However, Reynolds (1990) also found that Welsh secondary pupils performed worse than their peers in England on standardised tests given by the Assessment and Performance Unit. Additionally, according to Her Majesty's Inspectorate the relative lack of achievement in Welsh schools was not only manifested in examination results, but also in the quality of day to day lessons (OHCMI 1993). The same report concluded that "*in Wales overall... much under-achievement remains*" (OHCMI 1993 p.2) and Reynolds (1990) decided that Welsh children are, in some respects, "*schooled to fail*".

The Welsh school-effect

The findings above have been generally accepted as valid and reported by other writers, including the present one (e.g. Gorard 1997a). Welsh under-performance is chiefly supported by the kind of figures that would never be accepted in a comparison between schools, where the demand for value-added

models has long been documented (e.g. Gray and Jones 1986, Mortimore and Mortimore 1986), but which are deemed sufficient for the creation of international league tables. However, it is simply not sensible to compare the performance of the whole of England with Wales, and the straightforward "home international" model used by the Welsh Office has little validity, not taking into account the significant differences between the two regions.

Wales is clearly different to England in terms of population. Until 1995 Wales had 8 LEAs, England had 109, any two of which (e.g. Hampshire and Essex) might have a population in excess of the whole of Wales. As an analogy, comparing examination performance in Wales to England is like comparing the rest of England to a region made up of solely Barnsley, Doncaster, Rotherham, Sheffield, Bradford, Calderdale and Kirklees. England would come out pretty well. Even though Wales is also much smaller in area than England, its population density is minimal by comparison. The least densely populated LEA in England is Northumberland and even that is three times as densely populated as Powys in Wales. The most densely populated LEA in England, Kensington, is over 12 times as dense as South Glamorgan (Cardiff). The remoteness of parts of Wales mean that notions of choice and diversity in schooling are non-starters (Gorard 1997$_b$). Schools are either smaller than in England with fewer facilities and more limited curricula, or children have to travel further there and back each day.

Wales has traditionally lacked a large middle-class, and even today the occupational class profile is clearly different to many parts of England. Wales has an older and ageing population, with a high proportion of retired, early retired and long-term sick, while registered unemployment in some parts is still high (Gorard 1997$_c$). Given these problems of remoteness, relative poverty and economic inactivity, it is perhaps not surprising that many observers have been less than impressed by the levels of attainment in schools in Wales.

In fact, the picture may not be quite as bleak as has been painted. An unpublished study carried out by the WJEC in 1992 compared the GCSE results from each of the Welsh LEAs with three LEAs in England with similar proportions of children taking free school meals. This provided no evidence that Welsh schools were under-performing (Heycock, personal communication with author). Additionally the absence of selective and fee-paying schools in

the region, although partly caused by the economic problems and local attitudes to learning that have been rehearsed elsewhere (Gorard 1997$_b$), can also be seen as a sign of general contentment with the standard of education in LEA schools. The following re-analysis of comparative school performance seeks to cast new light on the "schooled to fail" thesis, and the findings suggest that Wales has little to fear from further comparisons with its more prosperous neighbour.

Methodology

The study uses three main sources of information about LEAs - the examination results for 1993/94 in England (DfEE 1994$_a$) and Wales (Welsh Office 1995$_e$), the percentage of children taking free schools meals in England (DfEE 1994$_b$) and Wales (Welsh Office 1995$_e$), the percentage of school-age children in fee-paying schools, the percentage of householders in each social class, and the population and area of each LEA (Census 1991). The results for 1994 are used since they are from the last complete academic year before the local government reorganisation into unitary authorities in Wales (see Welsh Office 1996).

The performance measure chosen was the GCSE benchmark of the percentage of the relevant age cohort gaining five or more grades A-C, and as usual the figure in 1994 was lower for Wales than that for England. This benchmark figure was used for several reasons. It is the most commonly quoted, used in government publications, in league tables, by press and other media, and by the articles cited above. This is not to say that another examination measure, such as percentage gaining no qualifications aged 16, or a performance indicator other than examinations, might not be better. The analysis can and will be repeated in the future with other outcome measures, other years, and further independent variables. There are however, metric problems in using the percentage leaving with no qualifications as a comparator since children in Wales can take the very elementary Certificate of Education which is not available in England. The purpose of the analysis described here is anyway merely to show that basing educational policy initiatives on simple comparisons of raw scores between regions, the "home internationals", is a nonsense.

The independent variables used to characterise the LEAs are social class, poverty, population, area, and population density. These are used for two main reasons. They are conveniently available at this level of disaggregation, and they have been linked to school performance both by this study and others. Family social class has been shown to be strongly linked to school performance, therefore the proportion of families in each LEA with social class 1 and 2 backgrounds is linked to LEA performance (Bellin *et al.* 1997). Similarly poverty, as assessed by free school meal provision is an excellent indicator of examination performance (Lake 1992). The geographical features of each LEA are used to distinguish urban, suburban, and rural areas which have been shown to be relevant to educational achievement (Gordon 1996). Population density in particular can be seen as relevant to school outcomes in a market system of schooling, while the area of the LEA gives an indication of the time children spend travelling each day. Although there are other factors that could be built into the model, some of which were tried and rejected in this study, many are highly correlated with each other, such as the proportion of lone parents and free school meals. Others, such as differential selective school policies and proportions of children at fee-paying schools or opted-out schools, have been found to be insignificant in previous analyses of the LEAs in England (e.g. Gordon 1996).

The secondary data were collected for all 107 English LEAs (excluding the micro-LEA of City of London and combining the Scilly Isles with Cornwall) and the eight Welsh LEAs, and converted to percentages where necessary. Since all data were real numbers, the correlations between them were calculated using Pearson's r (Gorsuch 1972). The data were further analysed in two ways. Firstly, for each Welsh LEA, the most similar English LEAs on each measure were identified as being potential candidates for comparison. Secondly, a multiple linear regression analysis was used to explain the variance between all 107 English LEAs in terms of the independent variables (Achen 1982). It does not really matter whether regression was used in order to predict or explain LEA performance (cf. causatory models in Gorard *et al.* 1997). The essential question to answer is what can be expected of each LEA given its determining characteristics, and from this to extrapolate what can be expected of each Welsh LEA. Multiple regression is similar to the series of individual analysis described above but with the added advantages of parcelling out the variance between potentially interacting predictors, so reducing the amount of unexplained variance (Pedhazur 1982). The

relationships between all of the predictors and the dependent variable are approximately linear (Maxwell 1977), and other diagnostics suggest that the other major assumptions underlying regression also hold (see for example Figure 1), although even where they do not the results can still be used with care (Berry and Feldman 1985). The variables were added to the model using forward stepwise entry (Norusis 1994).

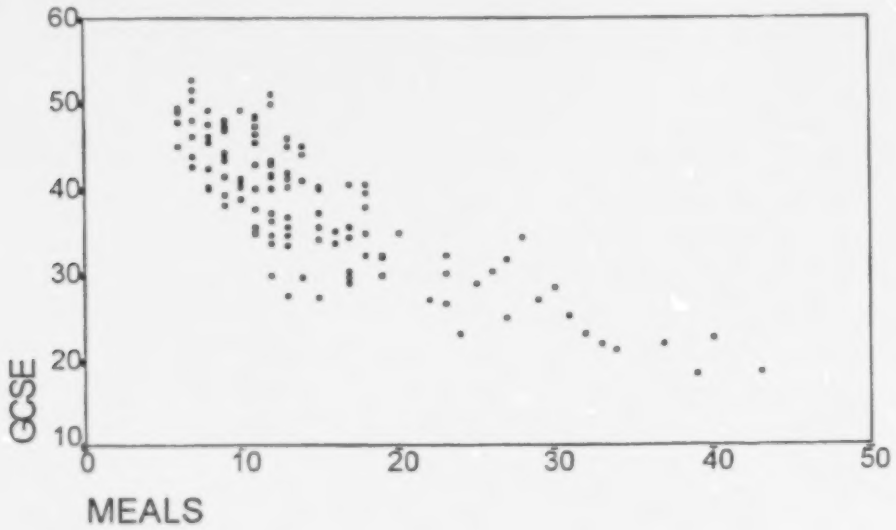

Figure 1 The relationship between examination results and free school meals

Results

All of the independent variables correlate significantly with the GCSE benchmark, with the percentage taking free school meals accounting for two thirds of the variance in results between LEAs by itself (Table 1). Using the school meal measure as an example, if only those English LEAs are considered that have the same percentage (i.e. within 0.5%) as Welsh LEAs, there is no evidence of a Welsh school-effect in 1993/94. Although Powys with a 45% benchmark has lower results than all three of its matches (Surrey 48%, North Yorkshire and Buckingham 49%), while Mid Glamorgan with 30% has lower results than both Oldham and Rochdale (32%), in general, Welsh LEAs appear to outperform their English equivalents. West Glamorgan

(38%) scores lower than Camden and Wirrall (40%) but higher than Walsall (32%) and Cleveland (35%). Clwyd (40%) is beaten by five English LEAs (Dudley 41%, Wigan 42%, East Sussex 43%, Richmond 50% and Barnet 51%) but scores higher than six others (Sunderland 30%, Gateshead 33%, Humberside 34%, Durham 35%, Leeds 36% and Kirklees 37%). Gwynedd (43%) has only two English LEAs above it (Richmond and Barnet), one equal (East Sussex) and eight below (the same LEAs as Clwyd). Gwent (35%) has a higher score than its only rival (Doncaster 34%). South Glamorgan (40%) has one LEA equal (Hounslow 40%), and four below it (Sandwell 27%, Tameside 34%, Sheffield 36% and Croydon 37%). Dyfed (45%) has one LEA above it (Cornwall 46%) and nine below it (Barking 28%, Merton 33%, Nottingham 35%, St Helens 36%, Calderdale 37%, Enfield 40%, Bedfordshire 40%, North Tyneside 41% and Bolton 42%).

Table 1
Relationship between GCSE results and LEA characteristics

	GCSE benchmark	Probability
Free school meals	-0.829	0.000
Social class 1 and 2	+0.587	0.000
Population density	-0.555	0.000
Area	+0.423	0.000
Population	+0.290	0.002

The analysis above can be repeated for each measure individually, and although the precise results alter each time and are sometimes confusing, they do not provide any evidence of a negative school-effect for LEAs in Wales. Although it is true that several of the independent variables are correlated, the figures are much less than that between each independent and the dependent variable. For example, social class and free meals only correlate at -0.224 (there is therefore little collinearity in the regression model below, Norusis 1994). Each predictor is therefore not measuring the same thing, as also evidenced by the elevated class profiles combined with relatively high meals figures for some London LEAs. These two figures together may give an indication of the range and diversity of social conditions in each area. Multiple regression is a more useful analysis since it takes all variables into account simultaneously and partitions the explained variance between them.

The best and most parsimonious model for predicting the 1994 GCSE benchmark figures for each LEA used only three of the potential predictors - the percentage of secondary school children taking free school meals, the percentage of householders in social classes 1 and 2, and the population density. The resulting model was an excellent one with high tolerance for all predictors (R square of 0.852, F of 214, probability of 0.0000).

The model is:

GCSE benchmark = 31.523 - 0.588*meals - 0.055*density + 0.454*class.

The predicted results for the eight Welsh LEAs are therefore as in Table 2.

Table 2
Welsh LEA performance table

LEA	Predicted	Observed	Difference
Clwyd	39.08	40.0	+1
Dyfed	39.28	45.0	+6
Gwent	36.47	35.0	-1
Gwynedd	40.78	43.0	+2
Mid Glamorgan	32.78	30.0	-3
Powys	47.51	45.0	-3
South Glamorgan	40.35	40.0	0
West Glamorgan	35.23	38.0	+3

On this analysis, Wales as a whole is doing as well as, perhaps better than can be expected in comparison to equivalent LEAs in England. Four LEAs in Wales are doing better than the model predicts, one is breaking even and three come out worse. There is no evidence here that children in Wales as a whole are being schooled to fail. In fact, schools in Dyfed, West Glamorgan and Gwynedd are to be congratulated. If the school population of each LEA is taken into account (by being multiplied by the size of the difference between observed and predicted) more children appear to gain by being at school in Wales than not.

Implications

Does any of this matter? Is it just pride and vanity? There are several reasons why it is important that a clearer and fairer picture of comparative performance emerges. Perhaps first and foremost it is important that the teachers in Wales gain the credit that they deserve as much as their colleagues in England, particularly in view of the strong criticisms of Welsh schools and teachers voiced by at least one former Secretary of State for Wales. Secondly, it is likely that despite "school effectiveness" research reporting the "schooled to fail" effect, local schools and families will know that it paints a false picture. This could tend to marginalise academic research for its intended users, and so divorce it from the practice of education which is to the benefit of neither party. Thirdly, the myth of poor Welsh schools may discourage families from moving to a fast-growing economic region in the UK. It may also encourage the setting of unrealistic performance targets, such as those in the People and Prosperity, and the Bright Future publications (e.g. Welsh Office 1997) or presaged by the talk of the educational gap between England and Wales in 1997 election manifestos, and the setting of overly-demanding standards by OHMCI who "are being targeted to reinforce action on these publications" (Jones 1996 p. 30). Finally and most directly, there are the effects on the current market in schools. Families may be encouraged to send their children to schools over the border for example, as the mine-owners of South Wales have traditionally done (Gorard 1997$_b$).

One of the pre-requisites necessary for the current competition between schools to lead to an improvement in educational standards is the correct mixture of "alert" and "inert" clients (Hirschman 1970). Those parents who are more alert to educational rights, problems, and opportunities provide the stimulus for change either by exercising their "voice" to the governors of the school, or by signalling their dissatisfaction through exit. Unfortunately it may be the parents most likely to bring about change who are also those most likely to leave (Willms and Echols 1992). "Choosers tended to select schools with higher mean socio-economic status and higher mean levels of attainment" (Cookson 1994 p.92), which may be a rational attempt to boost a child's attainment (Echols *et al.* 1990). Unfortunately, in terms of pupil ability, a "favourable school context" measured by mean pupil SES is a "zero-sum resource" (unless society becomes more affluent). What one school gains, the other loses. The policy of parental choice may therefore benefit choosers in

relation to everyone else without necessarily improving standards overall, and as the number of alert families increases, the proportion gaining any benefit at all may drop. Worse, since much of feedback to schools based on migration could anyway be incorrectly based on raw data, it might encourage the wrong changes. Effective schools in disadvantaged areas may be tempted to change in a hopeless attempt to prevent losing pupils, while less effective schools in better areas might be made complacent by the attractiveness of their high mean SES (Willms and Echols 1992). This could be the true damage done by the "schooled to fail" myth.

Conclusion

It is not suggested that the variables used here are the only ones, or even the best, available. Since comparisons between parts of the UK, however fruitless, will inevitably continue to be made, further analysis needs to be done, especially at the level of the new unitary authorities (since the Welsh counties described above officially disappeared in 1996), with other indicators, other years and a larger basket of predictors, such as ethnicity, first language, proportion of lone parents, educational qualification of the adult residents, absences from school and unemployment. The use of schools in one LEA by residents in another, perhaps even another home nation, the examination results of those in fee-paying schools, and the comparability of examination results between boards, modes, and years also need to be taken into account in a larger and more complex analysis. However, it bears repeating at this stage that there is as yet no indication that schools in Wales are generally performing any worse than schools in equivalent parts of England.

INITIAL EDUCATION TRAJECTORIES

Introduction

For the purposes of the study of which this working paper forms a part, a consideration of the quality of the initial schooling available to participants in Wales is crucial (see for example Gorard 1997_a). It is a fundamental assumption of this project that an attempt to facilitate the creation of a learning society requires not merely an attainable future objective but also a clear picture of the *status ante*. Without this there is no way of measuring progress, and more importantly there can be no inventory of those components of a true learning society that already exist or have existed in the past and which are worthy of celebration and preservation (see Gorard *et al.* 1997_a).

The "patterns of participation in adult education and training" study has provided primary data to back up the criticisms of accepted notions of a Welsh school-effect outlined above. These are in the form of initial education trajectories. The concept of a post-compulsory learning trajectory has been discussed in Gorard *et al.* (1997_c), and the methods used to collect and analyse the data are described in Gorard *et al.* (1997_b). The survey component of the study collected a brief initial education history from a systematic stratified sample of 1,104 householders in industrial South Wales, as background for the more detailed histories of their adult learning episodes. The participants are in the age range 15-65, representing cohorts still in full-time education in 1996 through to those who left school in 1945. The initial schooling and background characteristics of each participant have been used here to create a series of logistic regression models, of the same type used in Gorard *et al.* (1997_c) to analyse the much more complex post-compulsory learning trajectories also created by this study.

Qualifications at 16

1,094 respondents who were aged at least 16 reported their qualifications at age 16, of whom 24.5% gained the equivalent of 5 or more GCSEs grade C or above (GCE 'O' levels). There was no significant difference overall by gender

(25% male, 24% female), but there were clear differences by age and area of residence (see Tables 3 and 4). The percentage of each age group obtaining the benchmark figure has risen over time, most noticeably for those leaving initial schooling after 1956 and again for those leaving after 1986. As suggested by the level of qualification of the population as a whole in each research site (see Gorard 1997c), people living in Bridgend were much more highly qualified on leaving school than those in Blaenau Gwent, while those in Neath Port Talbot are somewhere in between.

Table 3
Qualifications by age cohort

Cohort	5+ O levels
15-24	47%
25-34	30%
35-44	30%
45-54	23%
55-64	13%

Table 4
Qualifications by area

Area	5+ O levels
Bridgend	53%
Blaenau Gwent	15%
Neath Port Talbot	34%

Predicting qualifications at 16

One of the logistic models of the determinants of outcomes of initial education, used to predict whether someone will obtain the equivalent of 5 or more GCSEs grade C or above by the age 16, confirms the importance of social and economic factors to certification at school as shown in the first section of this paper. Here however the analysis is on a personal level, using only general background information relating to respondents when they were aged 15 or less to predict their examination results at 16. The analysis confirms that described above at an LEA level, in that qualifications are

largely predictable in terms of criteria which are not directly school-related. Therefore, although qualifications at 16 have been shown to be an important determinant of later participation in adult education and training (see Gorard *et al.* 1997c), this finding suggests that qualifications may be more of a summary proxy variable for the predictors used in the model below, than a determinant/barrier in their own right.

The dependent variable was based on the qualifications gained by each respondent from initial schooling by the age of 16. It was converted into dyadic form, using the now familiar benchmark figure of 5 or more GCSEs at grade C or above (or their equivalent) as the criterion of demarcation (see above). An attempt was made to predict who achieved the benchmark, solely in terms of each individual's background characteristics. The trajectories were devised over a period of time as successive waves of the survey results arrived, and logistic regression models were created and modified to try and predict the results for each respondent based only on what they report about themselves up to the age of 16. There were 19 potential predictor variables comprising:

year of birth
area of residence
gender
ethnicity
family religion
language spoken at home
whether a regular school attender
length of residence in South Wales when aged 15
type of secondary school attended at age 15
number of children by age 15
number of siblings when aged 15
the age at which each parent left school
occupational class of each parent
social class of each parent
educational qualification of each parent

These were fed into a series of equations having a dependent variable with only two values - whether the respondent is predicted to obtain 5+ GCSEs A-C - and this was found to be almost 90% accurate (see Table 5) with a clear

division between the two groups at odds of around 2:3 (see Figure 2). The quality of the model in terms of goodness of fit to the data and its log-likelihood is adequate for the purposes of this analysis while still being capable of further improvement (Table 6).

Table 5
Classification Table

observed/predicted	below benchmark	obtain benchmark	correct
below benchmark	465	54	89.60%
obtain benchmark	24	172	87.76%
Overall	89.09%		

Figure 2 Observed groups and predicted probabilities
[Predicted probability is of membership for benchmark qualification
Symbols: 0 - less than 5 'O' levels 1 - 5 or more 'O' levels
Each symbol represents 12.5 cases].

Table 6
Quality of the logistic model

-2 Log likelihood	521		
Goodness of fit	529	df	significance
Model chi-square	259	15	.0000
Improvement	-7.581	4	.1082

This function retained only nine predictor variables or their interactions, the other ten independent variables explaining no significant proportion of the variance net of the effect of the first nine, using backward stepwise selection (Norusis 1994) in order to maximise the effectiveness of the predictions while minimising the number of predictors (Pedhazur 1982). The nine independent variables were current area of residence, age cohort, gender, region of birth, main family language spoken at home, mother's social class, the year in which their father left school, type of school attended at school-leaving age, regular attendance at school, and the interactions between them (see Table 7). Most of the variables are categorical in nature with deviation coding (allowing simple use of interaction effects, Norusis 1994), so any change in the odds that they produce are measured in terms of an average respondent.

Two things are immediately apparent from Table 7. Firstly, the solution is not very parsimonious and therefore not very useful (perhaps tailored too well to fit the obtained sample), and secondly it is in many cases the interactions between variables rather than the variables themselves that are significant predictors.

Compared to the average respondent, the odds of gaining 5 'O' level equivalents are calculated from the antilogarithm of the sum of each of the coefficients for which the associated variable is "true" for the individual in question. In theory anyone can be fitted to the equation and their odds calculated. For example, a man aged 37 living in Neath who regularly attended a grammar school, born in South Wales and speaking Welsh at home, whose mother was a dentist and whose father left school in 1937, would have the following probability of gaining 5 'O' levels.

1/(1+(e to the power of - (-.50 +3.16 +.13 +1.62 +.68 -.41 -.016*37 +1.16 +2.27 +1.06 +1.09 -.37 -1.60)))

or over 99%

If this is compared to the example of a man from Neath in Gorard *et al.* (1997_C), who had a probability of 1/(1+e to the power of -279) or 99% of becoming a lifetime learner, it can be seen that the qualification at age 16 which is a significant predictor of lifetime learning patterns is itself predictable to a large extent through personal background, family

characteristics and educational history (as are whether someone takes any qualifications at age 16 and whether they stay on in education after 16).

Table 7
Variables in the equation

Variable	Coefficient	Significance
Area of residence		.39
Bridgend	+4.37	.48
Blaenau Gwent	-7.53	.54
Neath Port Talbot	+3.16	-
Gender by Area		.09
Male Bridgend	-.33	.03
Female Bridgend	+.33	-
Male Blaenau	+.20	.23
Female Blaenau	-.20	-
Male Neath	+.13	-
Female Neath	-.13	-
Age cohort		.99
15-24	+13.09	.90
25-34	-11.86	.89
35-44	+1.62	.93
45-54	+1.95	.91
55-64	-4.80	-
Family language		
English	-.68	.10
Welsh/other	+.68	-
Place of birth		
South Wales	-.41	.02
Elsewhere	+.41	-
Year father left school	-.016	.04
Mother's social class		.01
Professional	+1.16	.32
Managerial	+.48	.17
Non-manual	+.10	.74
Skilled manual	-.27	.58
Part skilled	-.02	.97
Unskilled	-.86	.04
Unwaged/other	-.59	-
Type of school		.88
Comprehensive	-4.80	
Grammar	+2.27	
Secondary Modern	-4.18	

Variable	Coefficient	Significance
Private/Ysgol/Tech.	+6.71	
School by attendance		.78
Comp. attender	+4.57	.59
Grammar attender	+1.06	.89
Sec. Mod. attender	+5.53	.52
Other attender	-11.16	-
Comp. truant	-4.57	-
Grammar truant	-1.06	-
Sec. Mod. truant	-5.53	-
Other truant	+11.16	-
Gender by school		.00
Male Comp.	+.34	.09
Male Grammar	+1.09	.00
Male Sec. Mod.	-.28	.34
Male other	-1.15	-
Female Comp.	-.34	-
Female Grammar	-1.09	-
Female Sec. Mod.	+.28	-
Female other	+1.15	-
Gender by attendance		
Male attender	-.37	.04
Male truant	+.37	-
Female attender	+.37	-
Female truant	-.37	-
Area by attendance		.47
Bridgend attender	-2.62	.49
Blaenau attender	+4.22	.58
Neath attender	-1.60	-
Bridgend truant	+2.62	-
Blaenau truant	-4.22	-
Neath truant	+1.60	-
Constant	-.50	.98

[The "significance" equals the probability that the coefficient is actually zero, as determined by the Wald statistic, Norusis 1994. However, this is not a very accurate test when the coefficient is large, leading to potential rejection of significant parameters. Therefore the model has been iteratively tested both with and without each predictor and the above table shows the best fitting model using this criterion].

On the other hand a 37 year-old woman born in North Wales and living in Blaenau Gwent who regularly attended a comprehensive school, speaking English at home, whose father left school in 1937 and was employed a security

guard, and whose mother was a housewife, would have the following probability of gaining 5 'O' levels.

1/(1+(e to the power of - (-.50 -7.53 -.20 +1.62 -.68 +.41 -.016*37 -.59 -4.80 +4.57 -.34 +.37 +4.22)))

or just over 1%

Accurate as these probabilities may be for the sample obtained, the formula is too lengthy to produce more than indications of the patterning within the data. Further analysis is needed to unpick some of the threads running through Table 7.

Changes in predictions over time

One way of simplifying the data is to examine each cohort in isolation, making the period and age effects relatively static within each analysis, and allowing easier recognition of the changes over the five decades considered in this study. There are two potential problems with this approach. Since the number of cases in each analysis now only averages 221, there will be less variation and appropriate models may appear easier to fit but the effects are likely to appear less significant. Also it has been shown that the proportion gaining 5 'O' levels is increasing over time from a very low base in 1946, so that it would be possible to predict whether someone aged 55-64 for example reached this benchmark with 87% accuracy merely by assuming that no-one does. However the percentage predicted correctly for each category is reasonably high in each of the following models (see Table 8 and Figure 3 for example) and the other diagnostics suggest a tolerable fit.

Table 8
Classification Table for oldest cohort

observed/predicted	below benchmark	obtain benchmark	correct
below benchmark	131	8	94.24%
obtain benchmark	6	21	77.78%
Overall	91.57%		

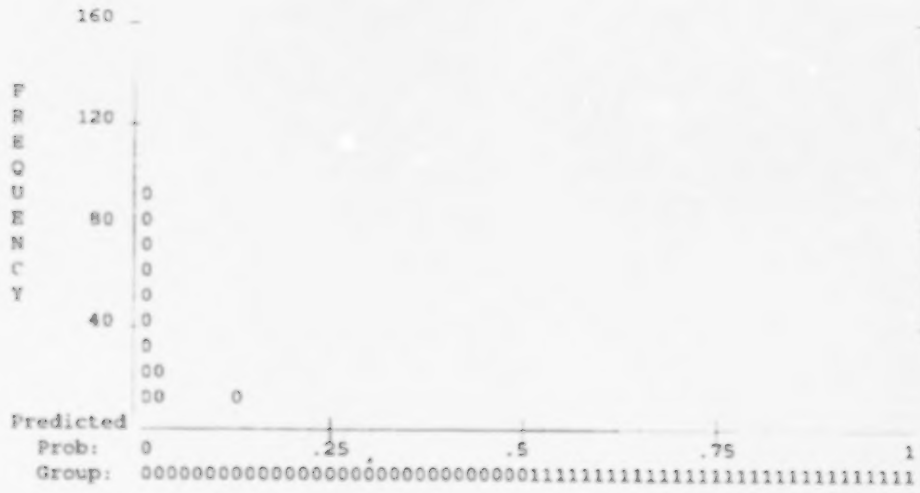

Figure 3 Observed groups and predicted probabilities (oldest cohort)
[Predicted probability is of membership for benchmark qualification
Symbols: 0 - less than 5 'O' levels 1 - 5 or more 'O' levels
Each symbol represents 10 cases].

When examined in this way, the type of secondary school attended has been the major determinant of qualifications at age 16 until fairly recently (Table 9). Until 1978, when the fourth cohort started to leave initial education, attendance at a grammar school was a clear predictor of higher qualifications, with grammar school pupils being of the order of 64 times more likely gain 5 'O' levels than those in secondary modern schools. Since the oldest respondents began to leave initial education around 1946, just as the reforms of the Education Act 1944 were being implemented, it is perhaps no surprise to note that for this cohort alone, their precise age is also a determinant of examination performance, with success growing during the decade.

For the next cohort, those leaving initial education from 1956 onwards, this age trend is absent, possibly because education is now truly universal and the tri-partite (bi-partite in Wales) system is in operation in most areas. From this time, there is a distinct area effect and the pattern remains unchanged to the present day. Those now living in Bridgend have a higher educational profile, those in Neath have a median profile, and those in Blaenau Gwent have a significantly worse profile. It should not be assumed from the pattern that this

picture has always been so. There are indications elsewhere that the relative educational attainment of residents have varied with economic changes (Gorard 1997c) so that, as Bridgend is currently an expanding site for production and services while the ex-mining valleys of Blaenau Gwent are relatively depressed, the picture is as predicted. There is a suggestion that pupils of recent non-white ethnic minority background gained better qualifications than average in South Wales at this time, perhaps because of a wave of relatively highly educated families from previous British colonies. However, the absolute number of non-white respondents is very small (see Gorard 1997) so the effect may not be significant.

Table 9
Changes in the determinants of certification

Age cohort	15-24	25-34	35-44	45-54	55-64
% Correct	77%	86%	80%	82%	92%
School		.0252	.0004	.0000	.0000
Age					.0430
Area	.0254	.0094		.0390	
Ethnicity				.5798	
Birthplace			.0000		
Year father			.0143		.1317
Gender		.0434			
Attendance		.0462	.0584		
Language		.9370			
Religion	.0736	.1019			
Mother occ	.1609		.2045		

For the third cohort, leaving school from 1966 onwards, those who were born outside South Wales have a clear advantage in terms of certification. This is not necessarily a regional effect *per se* (grist to the mill of the schooled to fail myth for example), since it could be true of all regions in the UK that the most mobile members of society, perhaps professionals who move where their job demands, are also the better educated. For example, residents of London born in South Wales may be generally better educated than those born in London. In addition, since this is the first generation to leave school who also had parents in school since 1944, the age at which their father left full-time continuous education becomes a good predictor of individual examination

success. Those whose fathers had prolonged and presumably more successful schooling are themselves more successful.

Interestingly, gender only becomes a significant indicator in the fourth, more fully comprehensivised cohort (see below). Boys in this cohort are a staggering three times as likely to gain 5 'O' levels as girls. Some might argue that this is a consequence of the prevalent increase in coeducation, a policy that can be seen as more directly beneficial to boys than girls (e.g. Spender and Sarah 1988, Tyack and Hansot 1990). This effect could also be linked to changes in school organisation, and a gender effect may have been present for the earlier groups in the guise of a school-type effect (differential pass rates at 11+, or preparedness of parents to pay school fees for boys and girls). From around 1978 attendance at a grammar school is no longer an advantage compared to a comprehensive, while a fee-paying or Welsh-medium education become better indicators of examination success (such pupils are eight times as likely as the average child to attain the 5+ benchmark). Speaking a language other than English at home may also be an indicator of examination success, but its significance is questionable since it represents so few respondents. This may be in part a continuation of the "ethnicity" effect above, and in part a confirmation of the social advantage of those attending Welsh-medium schools (e.g. Jones 1996). A more clearly relevant predictor is regular attendance at school. Those who admit to "truancy" are approximately 256 times less likely to attain the GCSE benchmark.

For the fifth and youngest cohort, family background influence becomes more relevant. Those with an Anglican or no family religion are less likely to obtain the benchmark, while those with Chapel, and to a much larger extent those with local minority religions such as Islam, are more successful. This finding could be seen as tying in with those above concerning Welsh-medium schools, ethnicity and first language, all of which also signify an advantage at this level. Pupils with a mother whose occupational class is management/administrative or to a lesser extent craft/related are also more likely to gain 5 GCSEs grade C or above. Therefore one attempt to encapsulate the trends since 1946 is that universal education may have had the unpredicted and unwanted effect of increasing the direct importance of social background in determining attainment. Initially, there was a huge growth in the number of pupils leaving initial education with 5 or more 'O' levels, and to a large extent their identity was determined at age 11 with pupils often separated by ability, gender and

religion. Results were therefore stratified by school type. As the schools became more uniform in type after 1966, where they were (their catchment area) may have become more important than what they were, and as the pupils became increasingly second-generation since universal education then the educational and class backgrounds of their parents became better predictors of success or failure than the school attended.

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